DOCUMENT RESUME

ED 246 885 IR 011 217

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TITLE Research on and Research with Interactive Video.
PUB DATE Apr 84
NOTE 13p.; Paper presented at the Annual Meeting of the American Educational Research Association (New Orleans, LA, April 23-27, 1984).
PUB TYPE Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Processes; Educational Research; *Instructional Design; *Media Research; *Research Methodology; *Research Needs; Videodisc Recordings; Videotape Recordings
IDENTIFIERS *Interactive Video

ABSTRACT

This paper suggests how educational researchers should approach interactive video in order to avoid errors found in traditional research on newly-developed instructional media. A distinction is made between research on interactive video and research with interactive video. Research on interactive video is divided into research which attempts to determine how to increase its effectiveness and research on how it relates to the broader instructional environment. The need for additional research on a number of issues which may be useful in increasing effectiveness is discussed, including the nature of interactivity, learner control, and the types of instructional functions facilitated by requiring an active learner response in an interactive video environment. Topics related to placing interactive video in a broader context that are discussed include whether the attributes generally associated with computers or video function differently in an interactive video environment and the methodologies used to examine interactive video. Attention is then devoted to how interactive video and its unique set of characteristics can be used to study other issues, such as concept acquisition and alternative branching strategies. (LMM)

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Research On and Research With Interactive Video

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A paper presented at the annual meeting of the American Educational Research Association, New Orleans, April 1984.

IR011217

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Research On and Research With Interactive Video

As interactive video begins to make its presence felt as a viable instructional medium, instructional technology researchers must begin to undertake a thorough, systematic analysis of the instructional potential of this medium. The manner in which this examination is conducted is vital to the development and utility of interactive video, for if the results of this inquiry are shown to be without a great deal of of merit or potential utility, it is likely that interactive video will simply be thought of as another technological innovation which promised more than it delivered.

Unfortunately, past history does not provide the researcher with adequate guidelines for studying the instructional potential of new technological innovations (e.g., motion pictures, television). Typically, researchers have attempted to determine the worth of a new advancement by comparing the results of an instructional sequence in which the medium was present with a similar sequence in which the medium was absent. However, this approach has been routinely criticized for providing results which were of only limited utility because the results were difficult to replicate.

If errors found in traditional approaches to research on newly developed mediums of instruction are to be avoided, it is necessary to provide guidance by identifying research issues related to interactive video at a somewhat early

stage in its development. To date, dialogue on such issues has been relatively scarce while discussion has centered on wishful thinking about the potential of interactive video.

This paper will attempt to provide a description of how interactive video should be approached by educational researchers. The distinction will be made between research on interactive video and research with interactive video. In the former, emphasis is place on research which attempts to determine how the effectiveness of interactive video can be increased as well as research on how interactive video relates to the broader instructional environment. In contrast, the paper will also discuss how interactive video and its unique set of characteristics can be used by the researcher to study questions which are related to issues other than interactive video.

Research On Interactive Video

The research needed to be conducted on interactive video can be divided into two major categories which, even though they occasionally overlap, are concerned with fundamentally different issues. One branch of this research is primarily concerned with the medium itself and attempts to determine how to maximize the instructional effectiveness of interactive video. In contrast, the other branch of research needs to focus on the relationship between interactive video and the broader instructional environment.

Improving the Practice of Interactive Video

Because interactive video is such a new and different technology, little is known about how to maximize its

instructional potential. Thus, questions related to the identification of instructional techniques and strategies which seem to be most appropriate for this medium, as well as relevant learner characteristics must be addressed. The scope of instructional design considerations is quite broad, including, but certainly not limited to, identifying characteristics of the text, graphics, audio, and video displays; types of instruction most suited to the medium; and the relative balance between computer and video components. Rather than discussing each of these in detail, let us simply agree that issues such as these are worthy of research and move on to a more thorough analysis of a set of issues which may, in the long run, be most useful in increasing the effectiveness of interactive video.

The nature of the interactivity associated with it is an area which is critical to developing an understanding of interactive video. This is a complex issue with many dimensions, one of which centers on the role to be served by the interactive qualities. The most traditional view of interactions is to have them serve as a checking mechanism in which the student is asked a question about some of the instructional content and then branched to an appropriate sequence. There can be little argument that this is a crucial role of interactions, but to limit interactions to serve as only checking mechanisms may neglect some potentially useful capabilities of interactive video. For example, interactions or questions can also be used as an information-gathering device in which the students uses the

interaction as a means of commanding the system to locate needed information.

Even this simple example illustrates the types of questions which need to be addressed by research in order to make better use of the capabilities of interactive video. If a student is going to be allowed to access information, then some type of information retrieval system must be incorporated into the system. Yet, little is known about the nature of such systems. Developers of videotex systems are still trying to determine whether this is best done with menus, maps, or other techniques. However, the audio and motion qualities of interactive video offer possibilities not available with videotex.

A related issue is concerned with the amount of freedom given to students to "explore" the interactive video program. Such research would need to find out such things as whether students should be allowed to access information whenever they desire or at specific checkpoints in the program. Not only would research need to explore how and when learners can control the program, but also what components of the program should a student be permitted to access. Would it be best to allow them to call up any portion of the program, and if so, what kinds of instructional design problems would result from developing instructional segments which may be viewed in a somewhat random sequence?

Many other facets of the interactive qualities of interactive video should attract the attention of

instructional technologist researchers. The versatile display characteristics of the medium suggest that nontraditional forms of feedback can be employed. No longer will feedback be limited to the written word or the computer-generated graphic; rather, feedback can take on the shape and sound of numerous video program formats, complimented by the appropriate use of many of television's formal features (e.g., slow-fast motion, pacing, camera angles, close-ups, etc.). In other words, interactive video has the capability of presenting totally new forms of feedback to the student, the exact nature of which must be determined by research.

Finally, a study of the interactive qualities would be incomplete without an examination of the types of instructional functions that can be served by requiring a response from a learner in an interactive video environment. Checking knowledge, providing novelty, emphasizing a point, directing attention, and modeling a behavior are just some of the many instructional functions which may be served by this one feature of interactive video.

Issues other than those related to its interactive qualities must also be explored. The inherent versatility of interactive video suggests that it is an appropriate medium for numerous types of learning outcomes. While the relationship between interactive video and many different types of learning outcomes my be worthy of a substantial research effort, probably the most useful area is related to how it affects cognitive processing strategies and

behaviors. If interactive video is more than simply the sum of video and computer technologies, then it should have the potential to uniquely model some cognitive processes. It may be likely, for example, that the interactive environment, along with the realism of video may better activate or supplant some cognitive strategies than the computer alone. For example, many problem-solving strategies suggest the need to periodically check one progress towards finding the solution. In such a situation, interactive video may model the process in an extremely meaningful context-- either intentionally, through the use of planned interactions, or unintentionally, by allowing students the freedom to access needed information.

Placing Interactive Video in a Broader Context

While the research just described may help increase our ability to produce more effective interactive video programs, the knowledge has only limited utility. Missing from such an approach is a greater understanding of how and where interactive video fits in the broader instructional context. In other words, focusing attention soley on the medium without relating it to other instructional strategies and techniques replicates research on other mediums, such as still pictures, which has not only left us with a limited understanding of the medium, but has not made any progress towards the development of a science of instruction.

One of the most important issues which needs to be examined relates to whether the attributes generally associated with computers or video function differently in

an interactive video environment. We know, for example, that more rapid pacing in video programs increases attention while slower pacing tends to increase comprehension. Yet, it is not certain that these generalizations will hold true in the interactive video environment where learners have the ability to actively respond after relatively short video segments.

The implications of such potential changes are quite important. If the manner in which attributes or instructional qualities function do, in fact, change then it would suggest that interactive video is a unique medium that is greater than the sum of its parts. It would then follow that as a truly unique medium, interactive video can make substantial contributions to instructional pedagogy. As more and more of the instructional qualities associated with effective interactive video are compared to the same qualities functioning in different instructional environments, research can help identify the precise nature of interactive video's contributions.

Any examination of the instructional attributes associated with interactive video must also appreciate that these attributes or qualities do not operate in a sterile, isolated environment. Instead, the dynamic nature of the instructional environment suggests that a single element in the instructional system both influences and is influenced by other elements in the system. The complexity associated with such a viewpoint indicates the need for a closer examination of the methodologies used to examine interactive

video. To gain a more complete understanding may require the increased use of multivariate techniques which can examine clusters of variables, as well as paying greater attention to the procedures and techniques of naturalistic methodologies.

Research With Interactive Video

Interactive video can not only serve as the object of research, but also as a tool for research in areas which are not at all concerned with developing a more complete understanding of the medium. Its ability to combine the text, graphics, and management capabilities of the computer with the realistic audio and visual features of video make interactive video particularly attractive to many different types of researchers. For example, those studying concept acquisition could use the video component of the system to easily present realistic examples and nonexamples, while also recording student responses with the aid of the computer. Thus, with little additional effort, the researcher is able to provide examples that are extremely realistic and which can include motion and sound capabilities with the added bonus of collecting the data in computer-ready form. Similarly, studies dealing with the affective domain would find the combination of computer and video features extremely useful.

Whereas the ability to present the realistic images associated with video while maintaining the management capabilities of the computer was the focus in the examples previously presented, other qualities of interactive video

should also be useful to researchers. Of particular interest is the ability of interactive video to easily incorporate stimulus materials which compare favorably with the technical quality of commercially produced materials. At first, this may not seem to be a significant research problem, yet when one considers the instructional research which has been criticized because the materials used were not representative of those found in actual instructional settings, the issue takes on greater importance. Generalizations formed from research which incorporates poorly produced stimulus materials cannot always be viewed with confidence. Unfortunately, it is beyond the scope of most researchers to develop a computer program, for example, which possess graphics and animation sequences on a par with those found in professionally developed programs; similarly, adapting an already existing program usually requires skills in machine language applications. In contrast, however, one could easily adapt a linear, commercially produced video program (subject to copyright restrictions) to to function in an interactive video program which would then include professional quality audio and video components as well as the possessing the appropriate qualities of the computer.

The study of alternative branching strategies could certainly benefit from the management capabilities of the computer. However, for the study to be a closer facsimile of what occurs in the classroom, the stimulus materials should be representative of commercially produced educational materials. Thus, the researcher faces a dilemma

of whether to produce an entire new and sophisticated program, to somehow adapt a professionally produced program to meet the specific requirements of the study, or, most likely, develop a simple, unsophisticated program. The first two options are extremely difficult and time-consuming, while the third will raise issues related to external validity. A fourth alternative would be to use one of the rather simple authoring systems available for interactive video systems to make a professionally produced video program interactive, thereby allowing the researcher to study branching strategies without the confounding effects of poor stimulus materials.

These are just several representative examples of how interactive video technology can be used as a tool by educational researchers, and in no way should they be considered as a complete set of potential research functions. As individuals become more aware of the technology and its characteristics, exciting and innovative uses will undoubtedly be found for using interactive video as a research tool.

Conclusion

To some, the distinction between research on and research with interactive video may seem obvious. However, the fact remains that in the past considerable research has used interactive video or other forms of instructional media without attempting to answer questions related to increasing the instructional utility of the medium. It should also be pointed out that the divisions between research with and

research on interactive video, while useful, are certainly not absolute. It is quite clear that some of the answers supplied by research which uses interactive video as a research tool will eventually help increase our understanding of the instructional potential of the medium. Similarly, distinctions between research on instructional design concerns of interactive video and that which attempts to place interactive video in a broader perspective is also not as precise as desired. Perhaps it is best to conceptualize these distinctions as points on a continuum, rather than as absolute categories.

In a similar vein, the suggestions offered in this paper should not, in any way, be considered the final word in the interactive research. Rather, they should be viewed as broad guidelines, representing the types of issues which must be addressed by instructional technologist researchers before interactive video can begin to realize its varied role in education.